FIG. 1

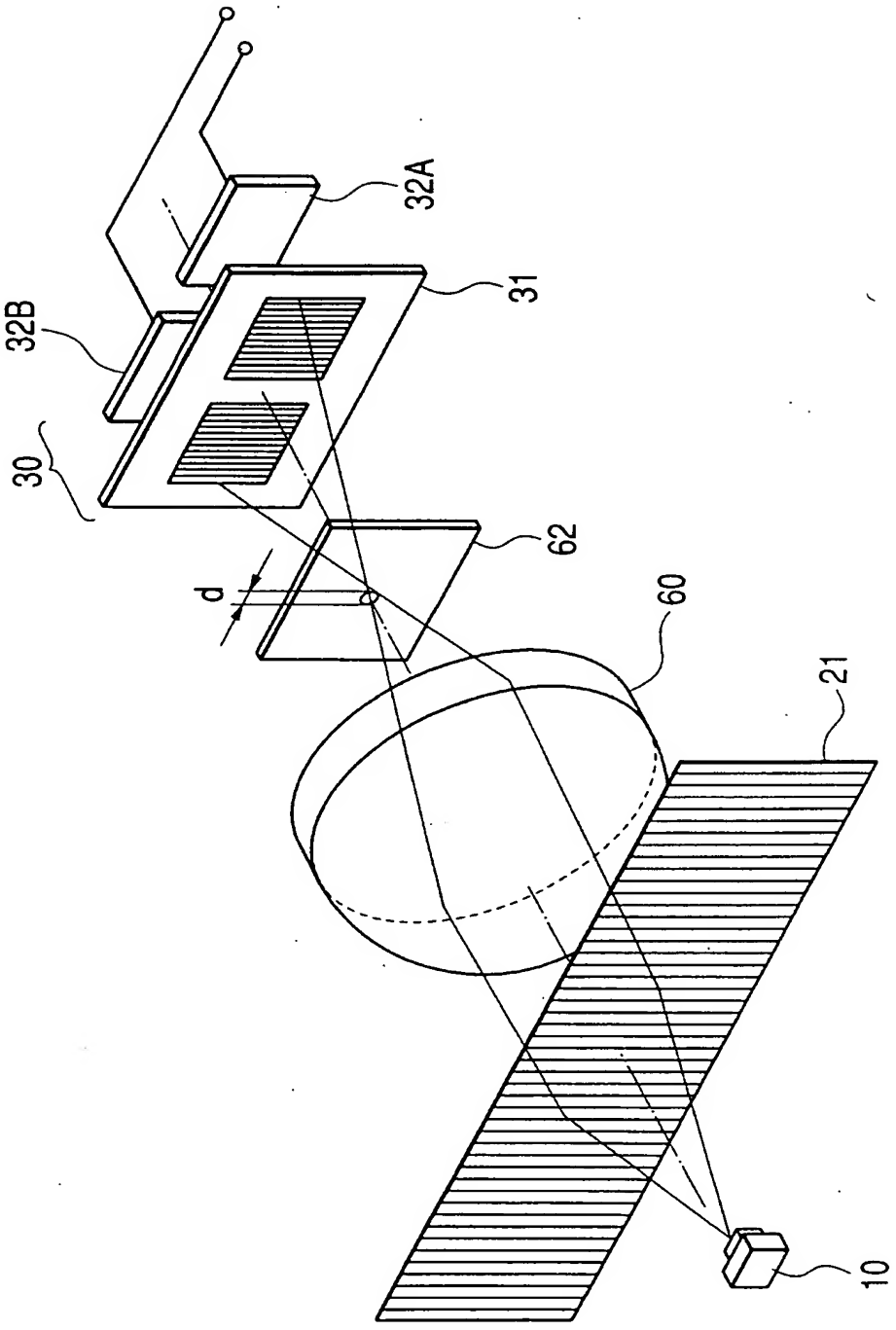


FIG. 2

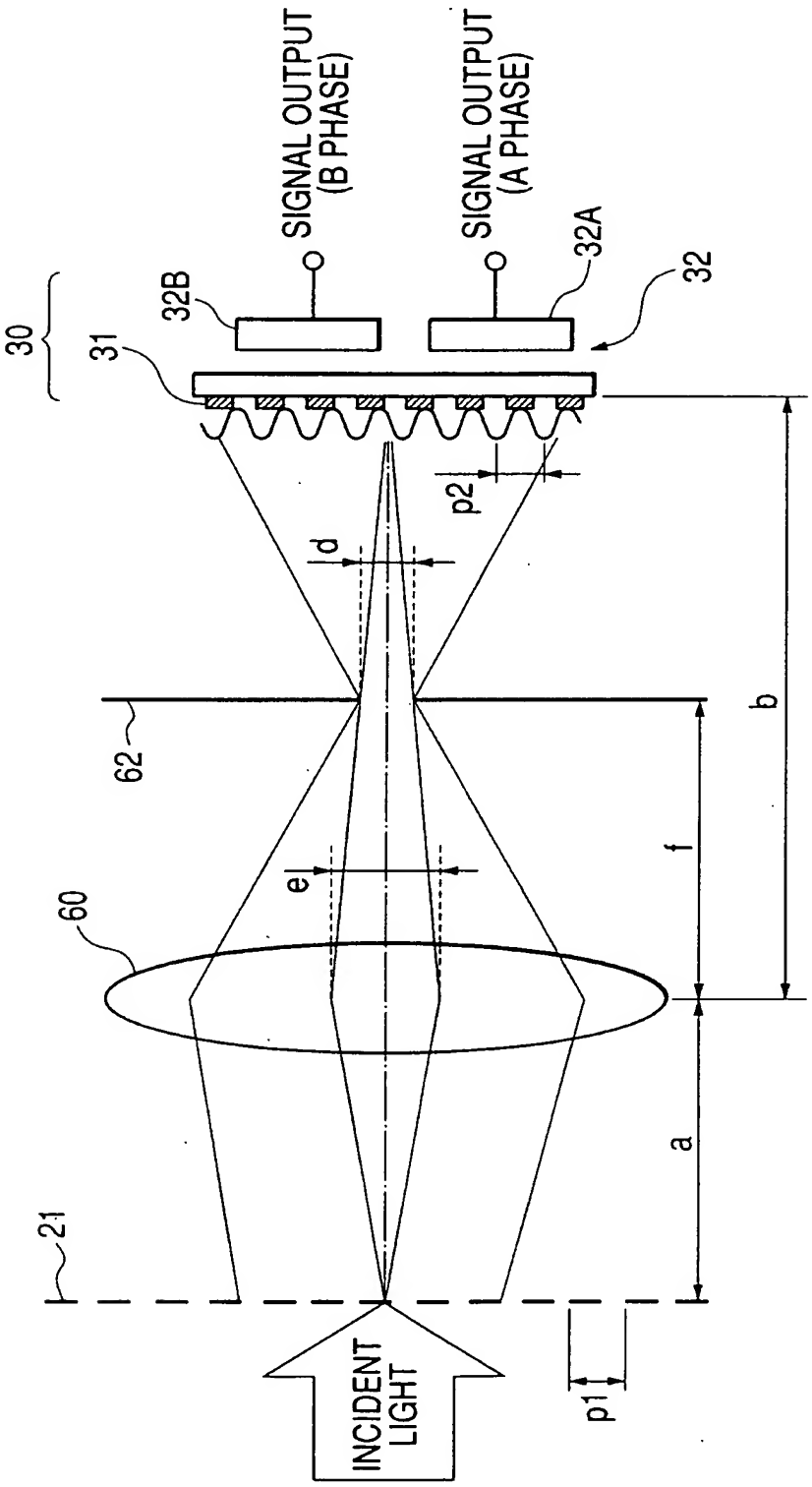

SIGNAL OUTPUT (B PHASE)
SIGNAL OUTPUT (A PHASE)
32B
32A
32
30
31
p2
d
62
b
f
e
60
a
21
INCIDENT LIGHT
p1

FIG. 3

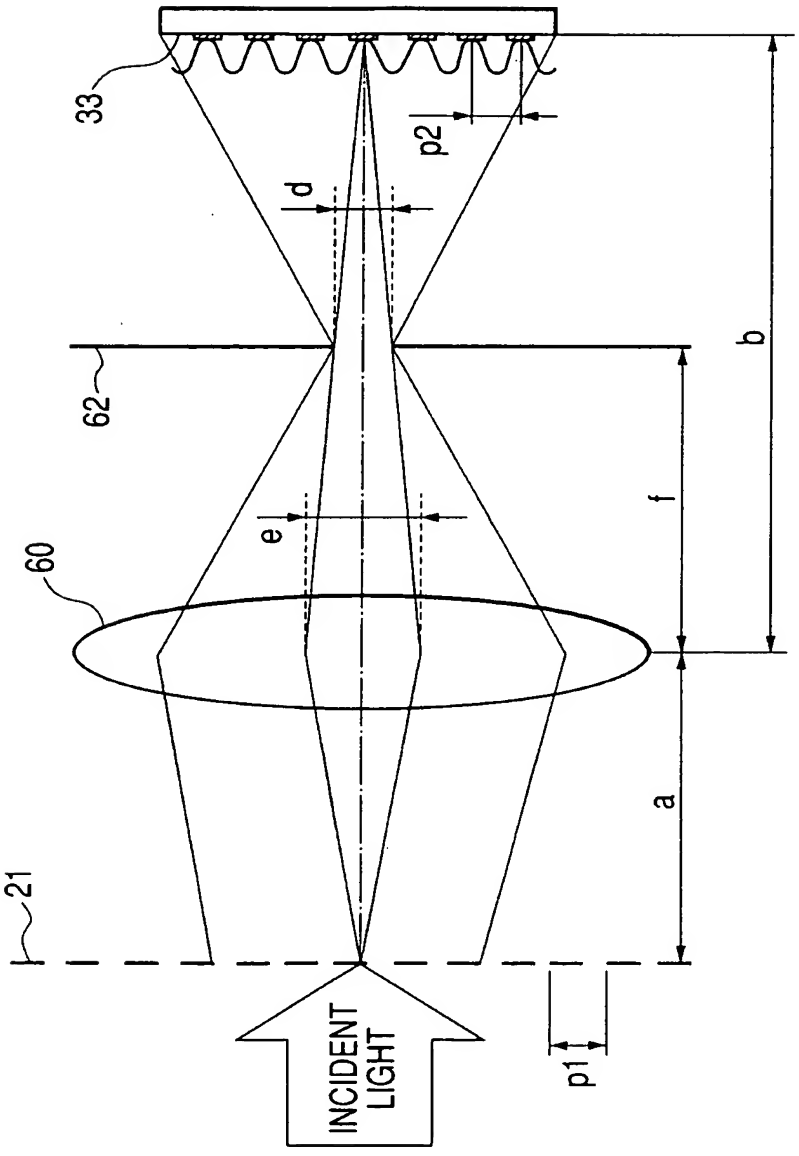


FIG. 4

OUTER DIAMETER DIS. (mm)	EFFECTIVE FOCAL LENGTH EFL (mm)
1.0	0.6
1.0	1.0
1.5	1.0
1.5	1.5
2.0	1.5
2.0	2.0
2.5	2.0
2.5	2.5
2.5	3.0
3.0	3.0
3.0	4.5
3.0	6.0
3.0	9.0
3.0	12.0
3.0	15.0
4.0	4.0
4.0	6.0
4.0	8.0
4.0	10.0
4.0	12.0
4.5	4.5
4.5	9.0
5.0	5.0
5.0	10.0
5.0	12.0
5.0	15.0
6.0	6.0
6.0	9.0
6.0	12.0
6.0	15.0
6.0	18.0
6.0	21.0
6.0	24.0
6.0	30.0
6.0	36.0
6.0	48.0
6.0	72.0
9.0	9.0
9.0	13.5
9.0	18.0
9.0	22.0
9.0	27.0
9.0	36.0
9.0	45.0

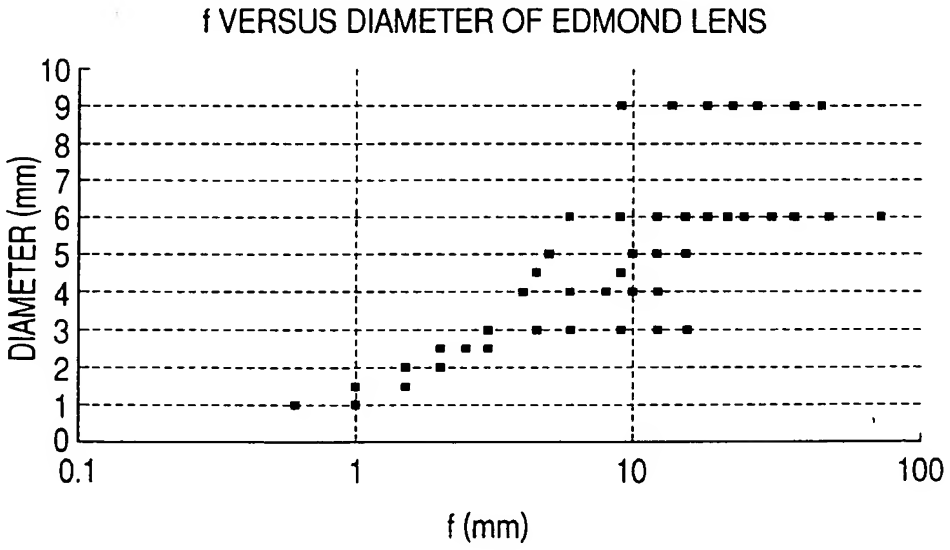


FIG. 5

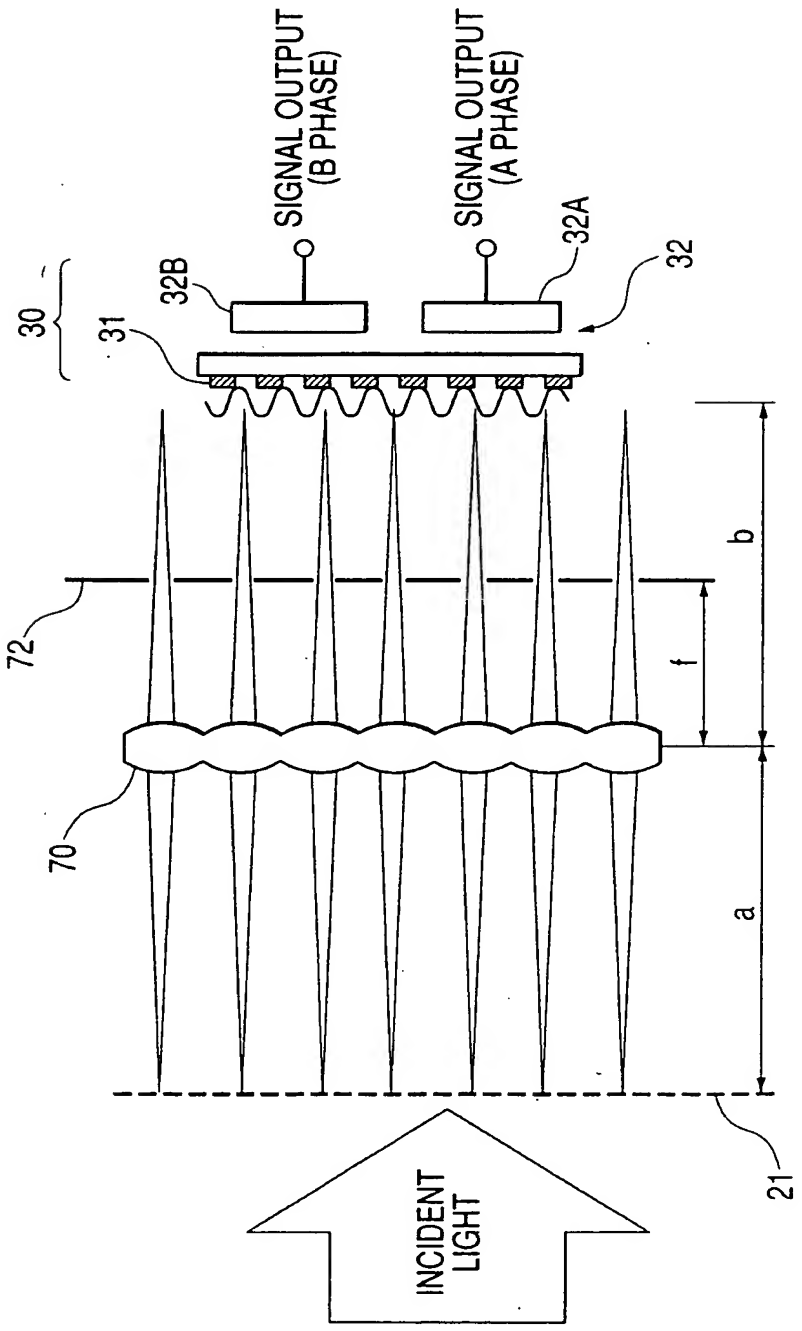

SIGNAL OUTPUT (B PHASE)
SIGNAL OUTPUT (A PHASE)
32B
32A
32
30
31
72
70
b
f
a
21
INCIDENT LIGHT

FIG. 6

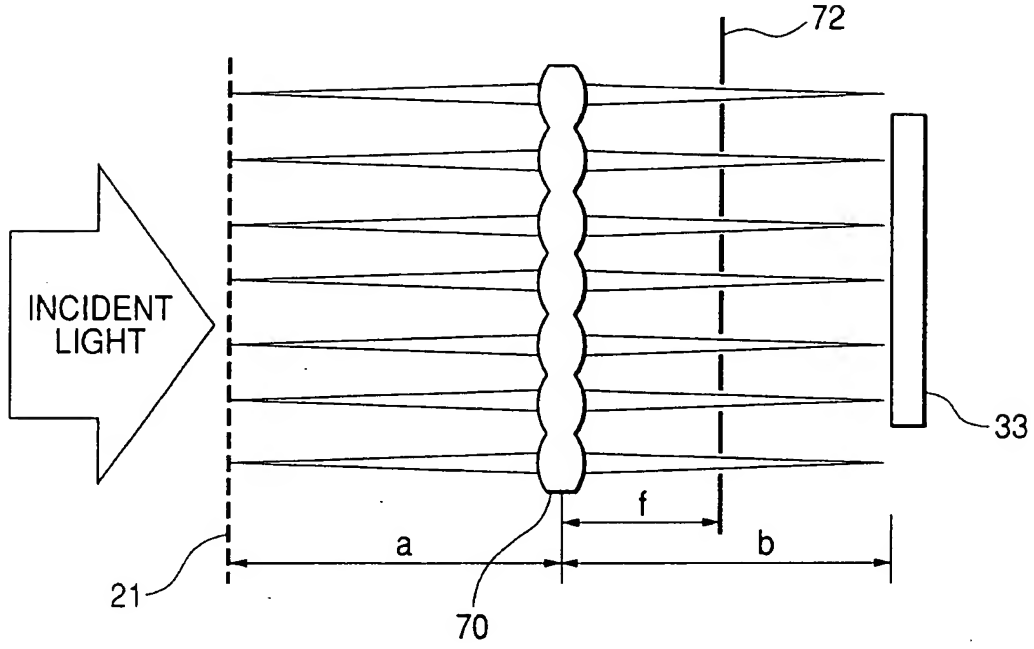

72
INCIDENT LIGHT
33
f
a
b
21
70

FIG. 7

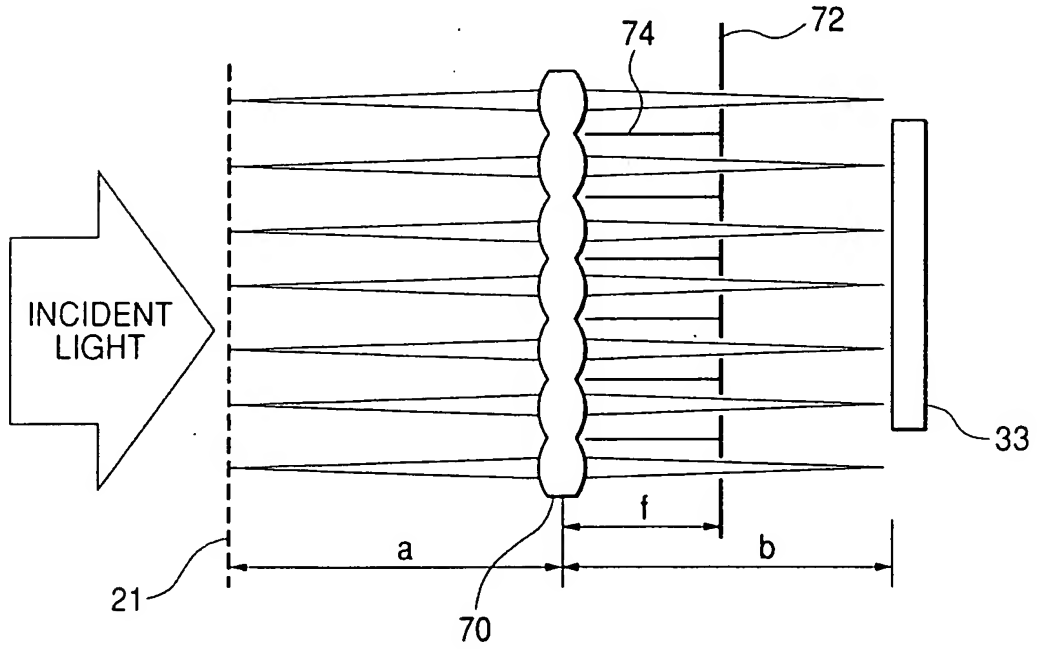

74
72
INCIDENT LIGHT
33
f
a
b
21
70

FIG. 8

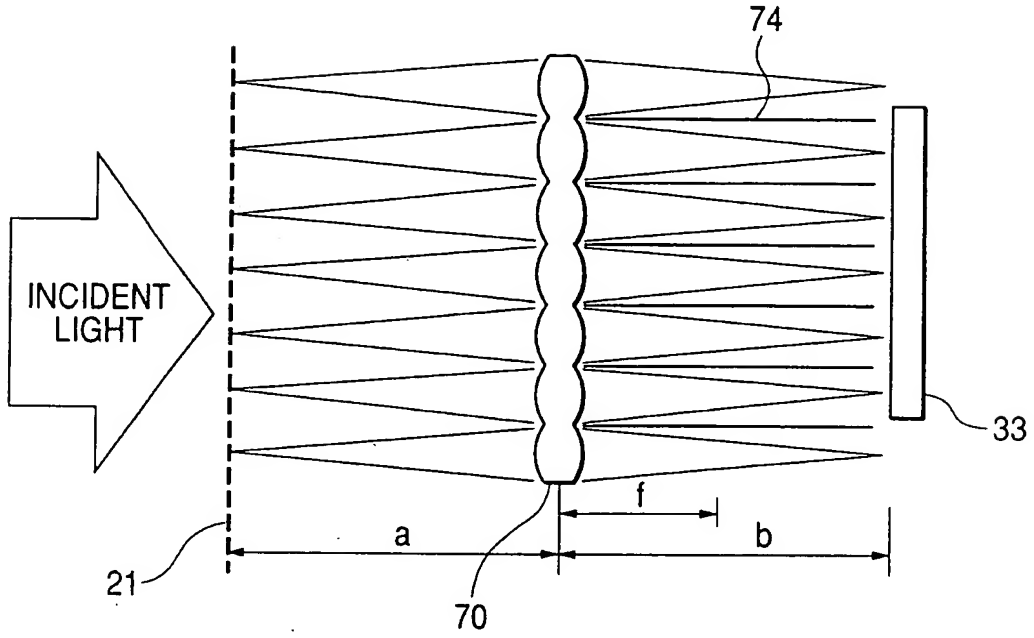

74
INCIDENT LIGHT
33
f
a
b
21
70

FIG. 9

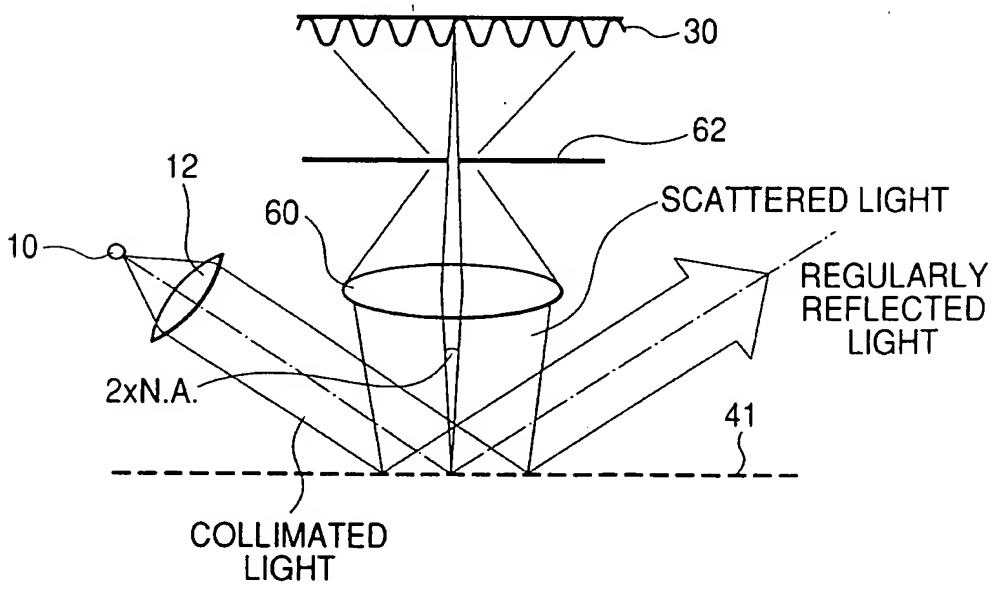

30
62
12
60
SCATTERED LIGHT
10
REGULARLY REFLECTED LIGHT
2xN.A.
41
COLLIMATED LIGHT

FIG. 10

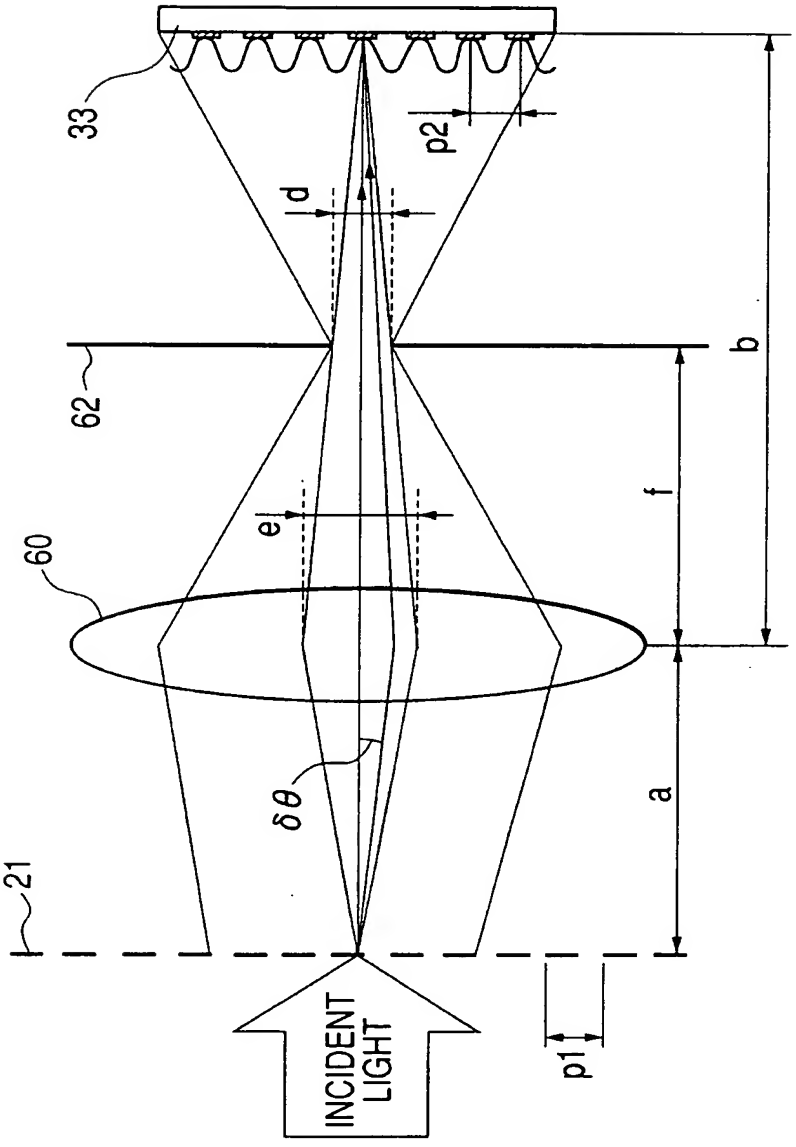


FIG. 11

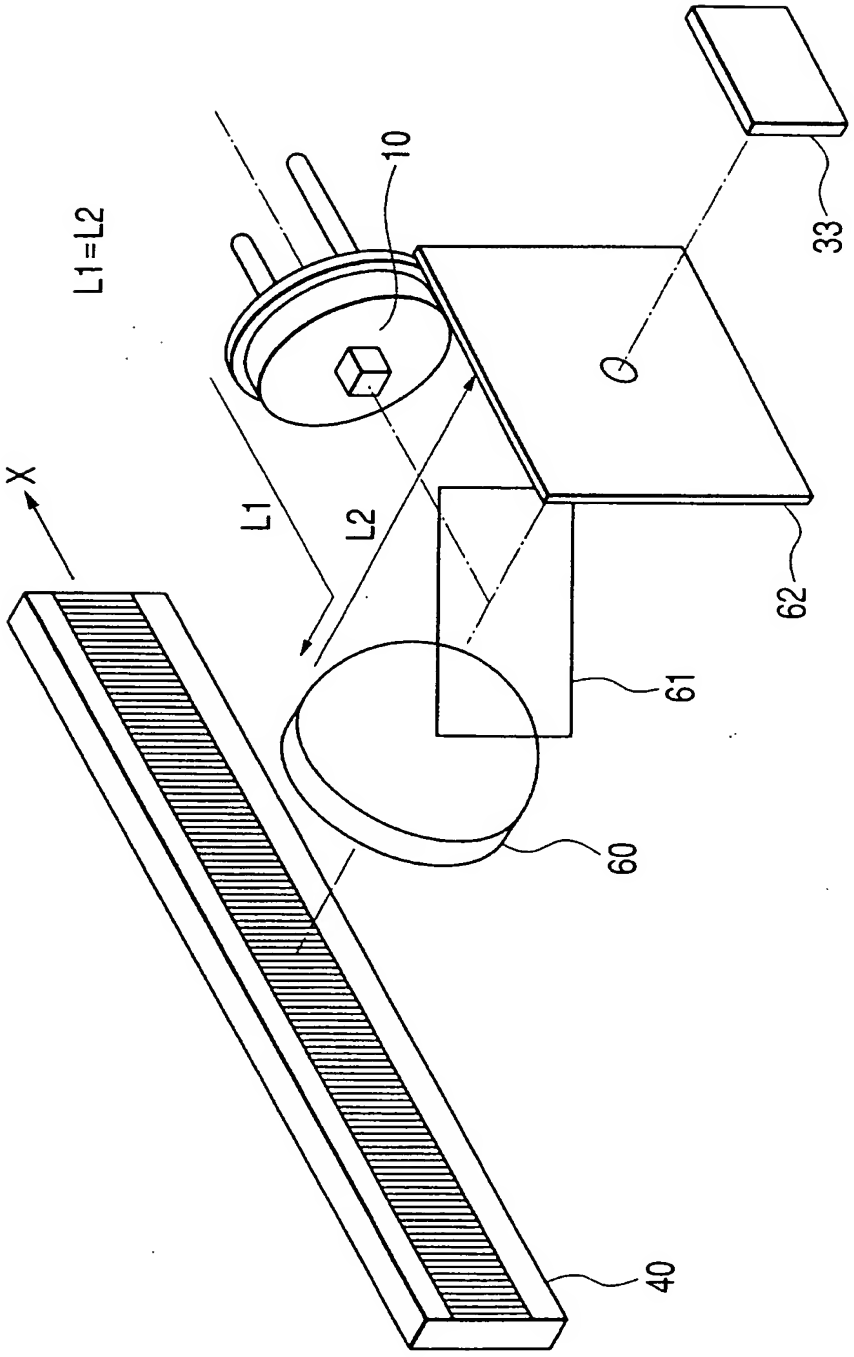


FIG. 12

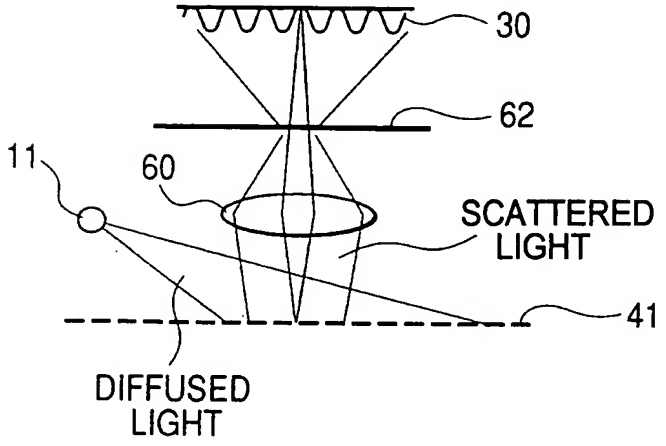


FIG. 13

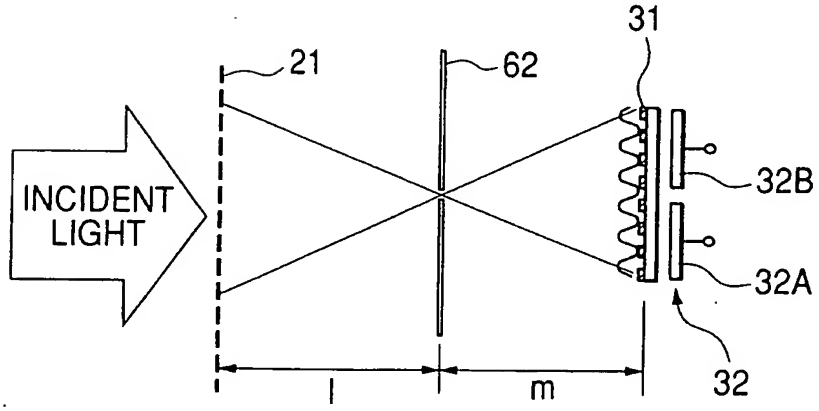


FIG. 14

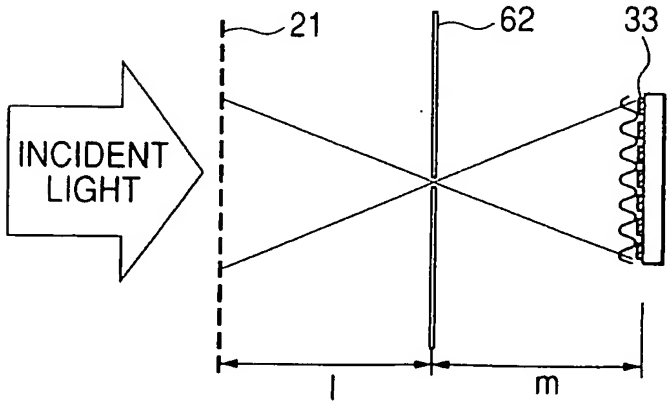


FIG. 15
PRIOR ART

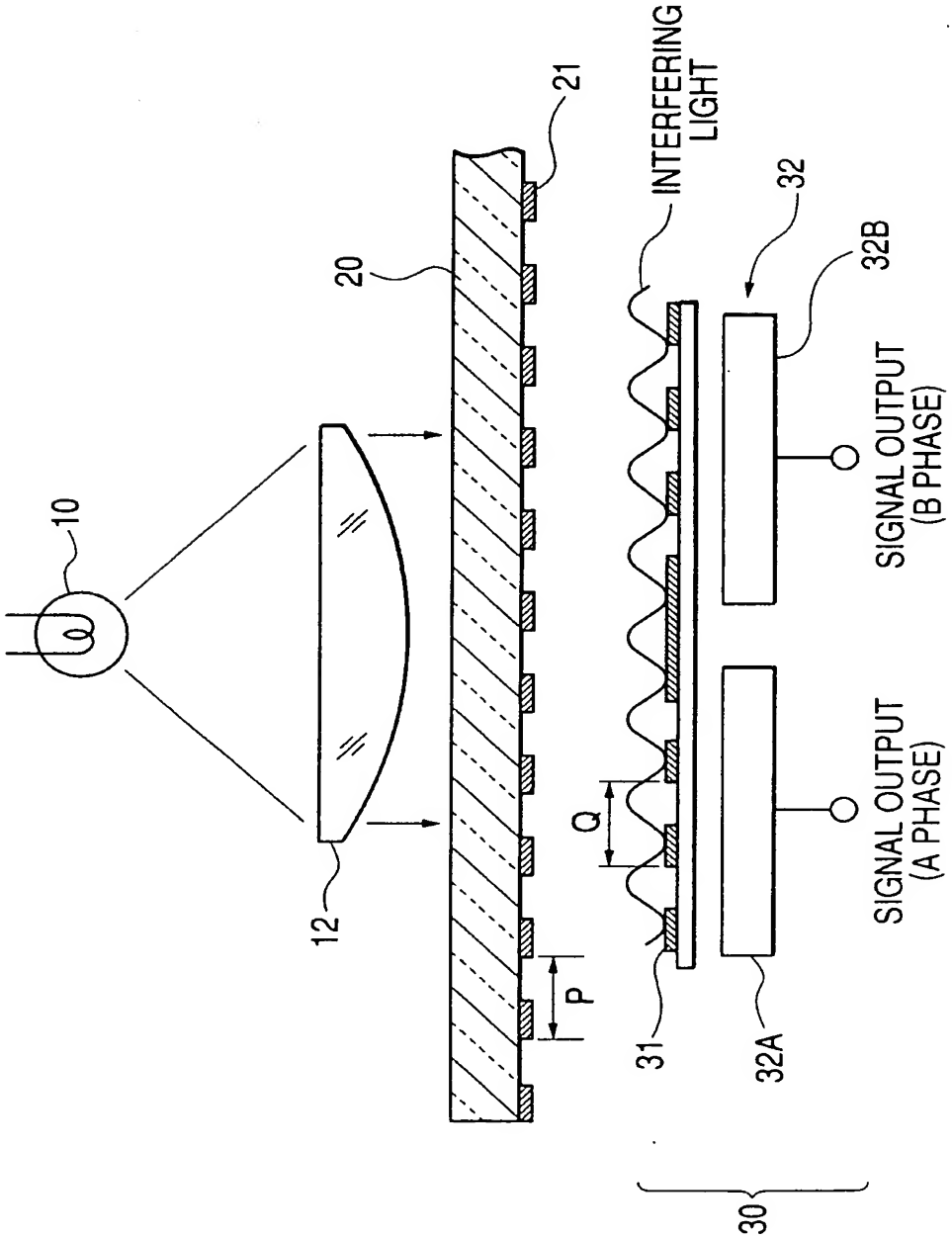


FIG. 16
PRIOR ART

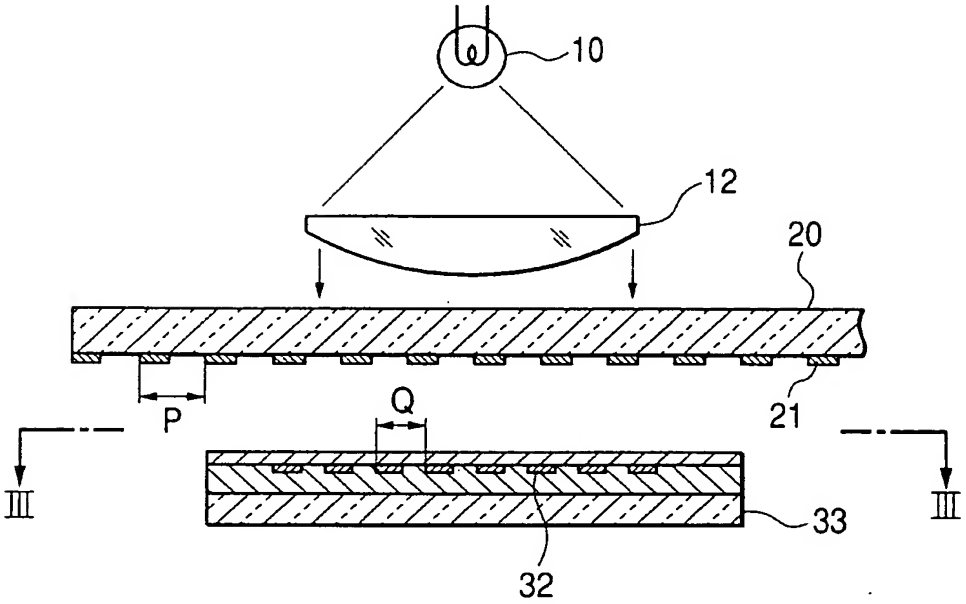


FIG. 17
PRIOR ART

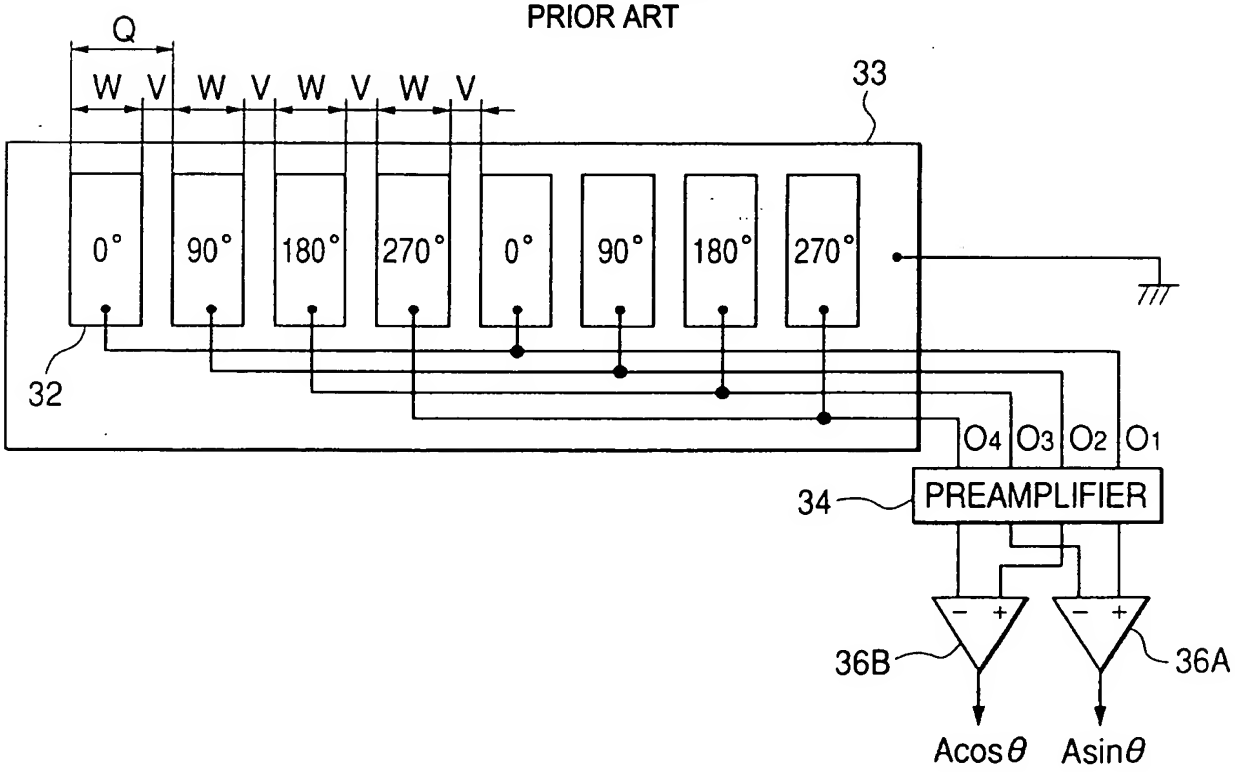


FIG. 18
PRIOR ART

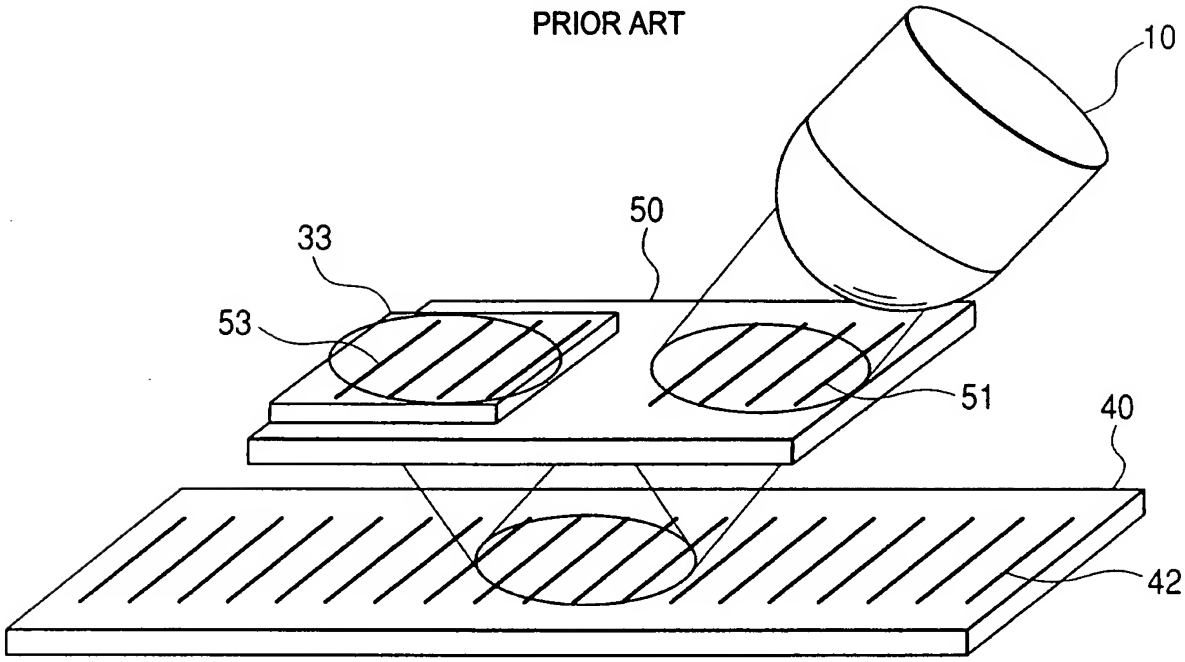
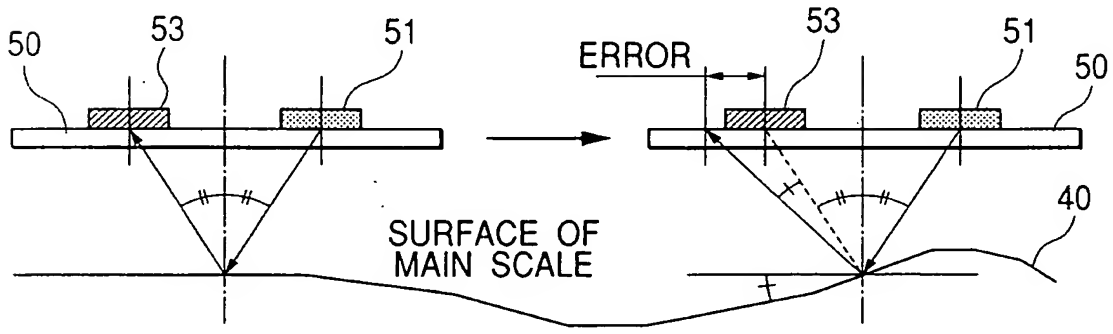


FIG. 19
PRIOR ART



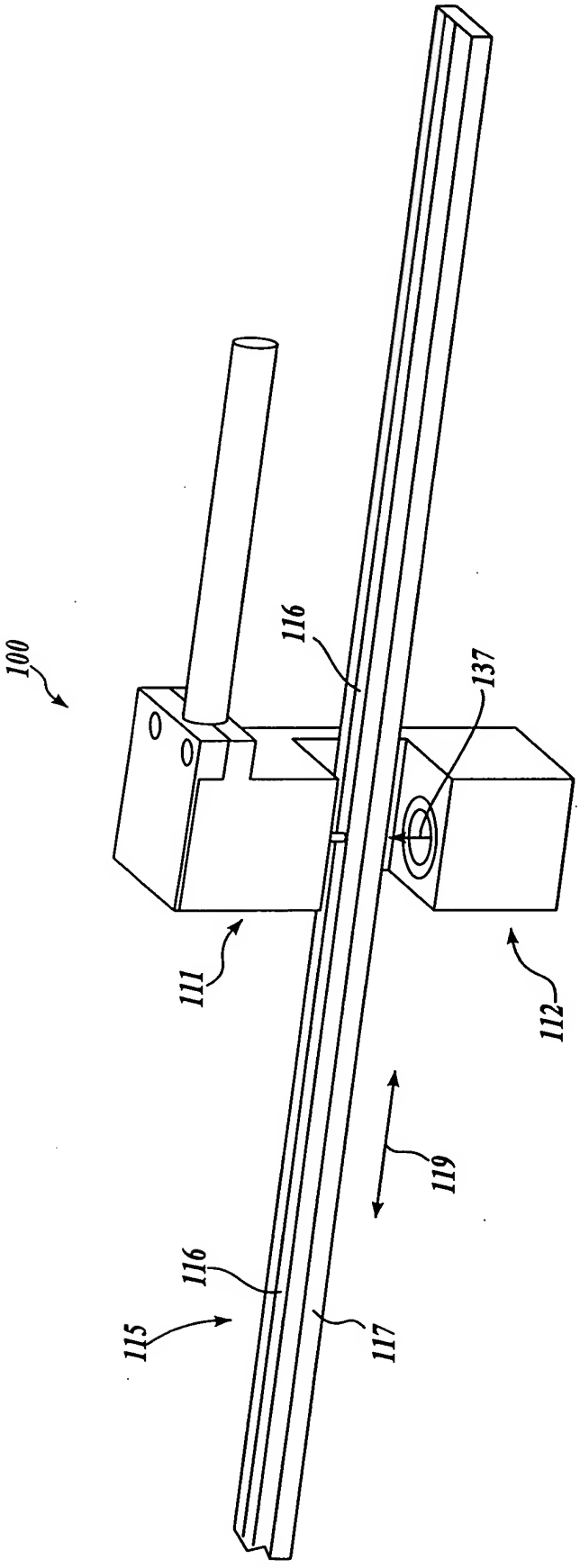


Fig.20.

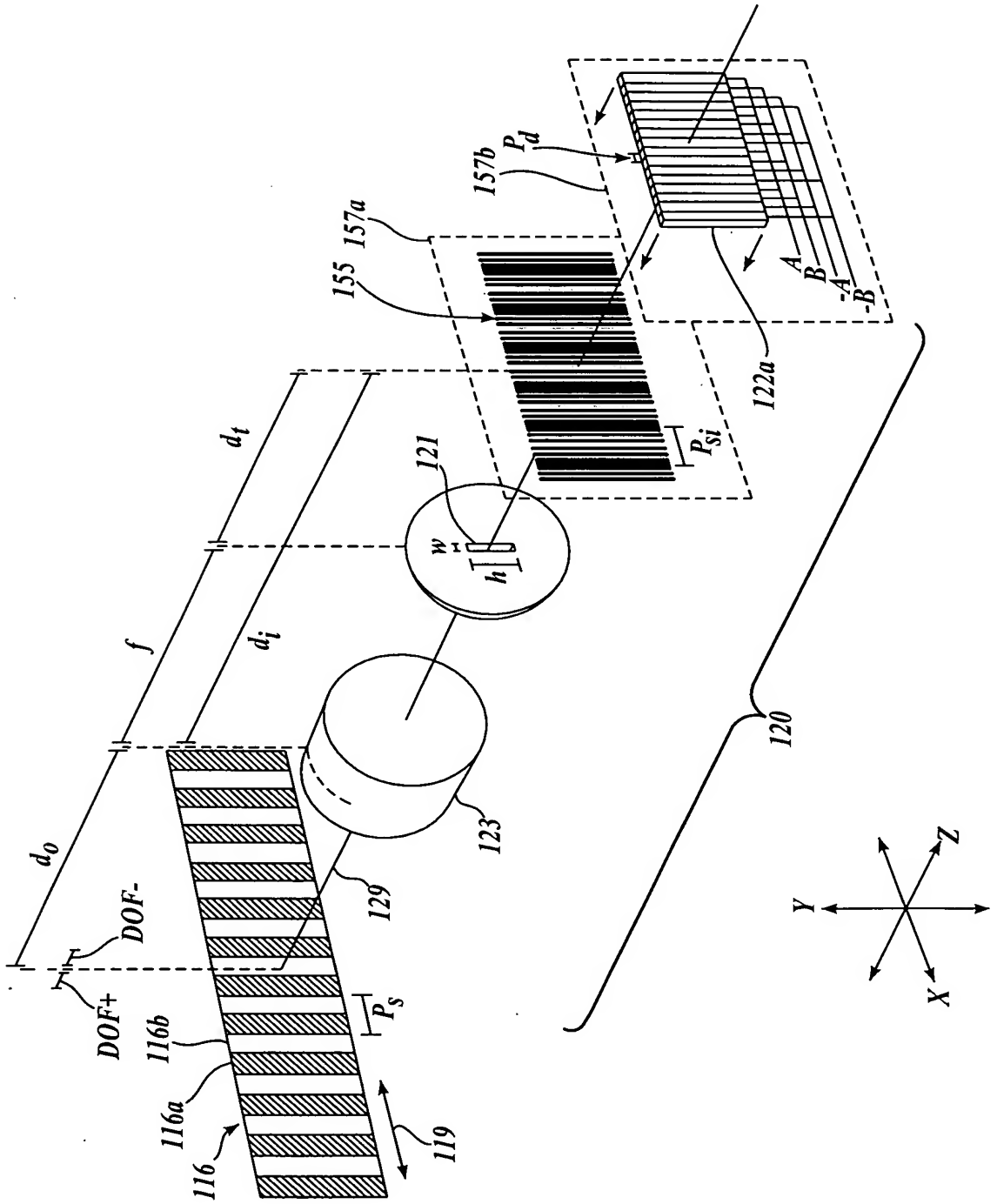

157b
P_d
157a
155
A
B
-A
-B
122a
P_{si}
121
w
h
d_t
d_i
f
d_o
DOF-
DOF+
116b
116a
116
P_s
119
123
129
120
Z
Y
X

Fig.21.

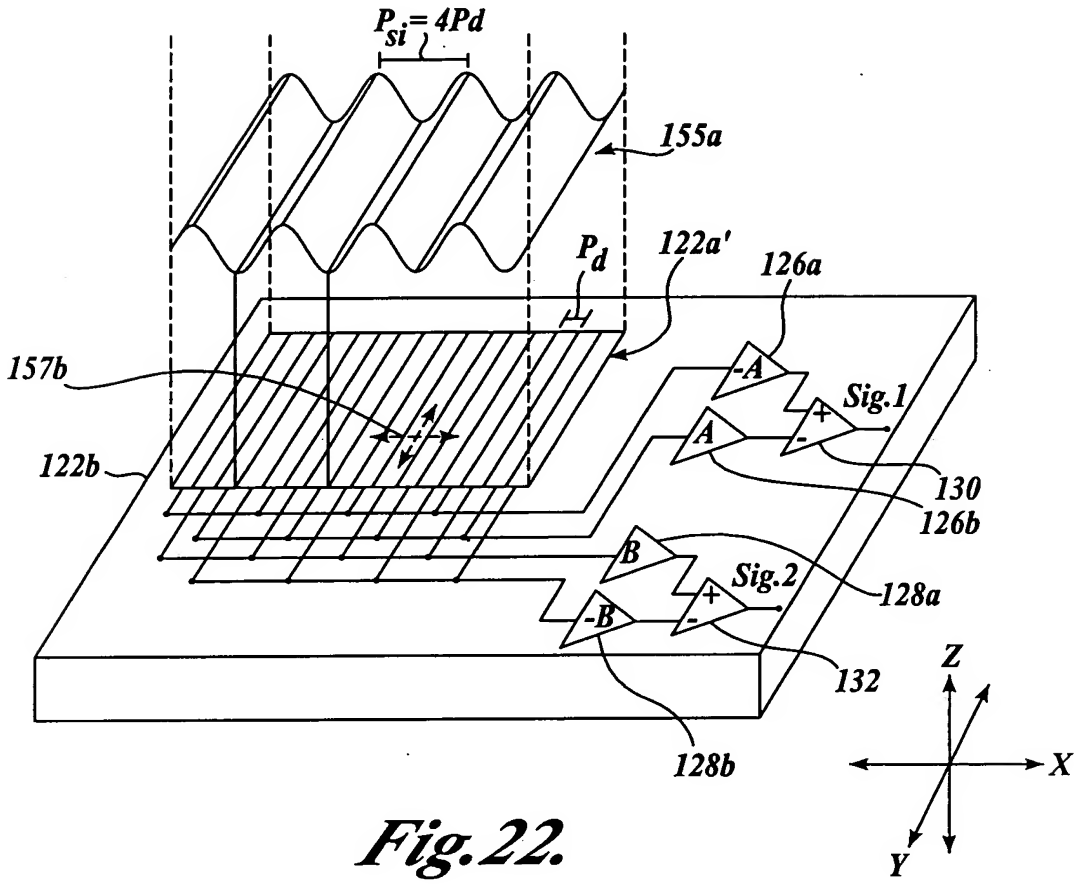

P_{si}= 4Pd
155a
P_d
122a'
126a
157b
122b
-A
A
Sig.1
130
126b
B
Sig.2
128a
-B
132
128b
Z
X
Y

Fig.22.

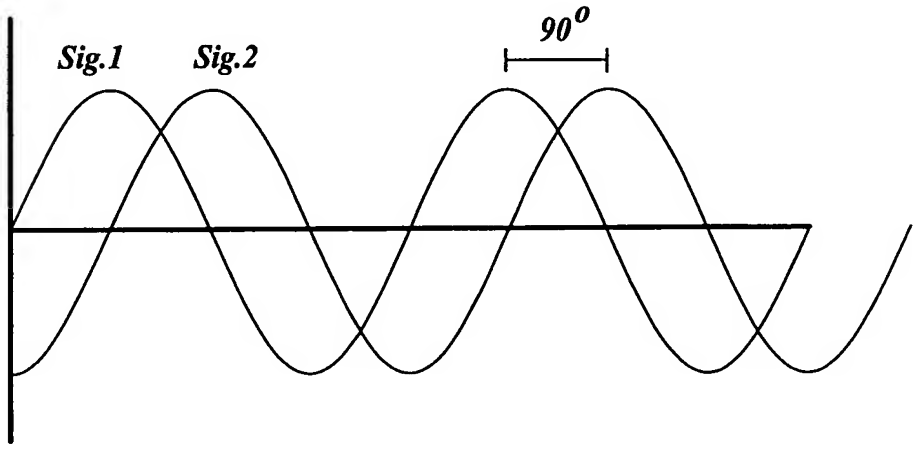

Sig.1
Sig.2
90°

Fig.23.

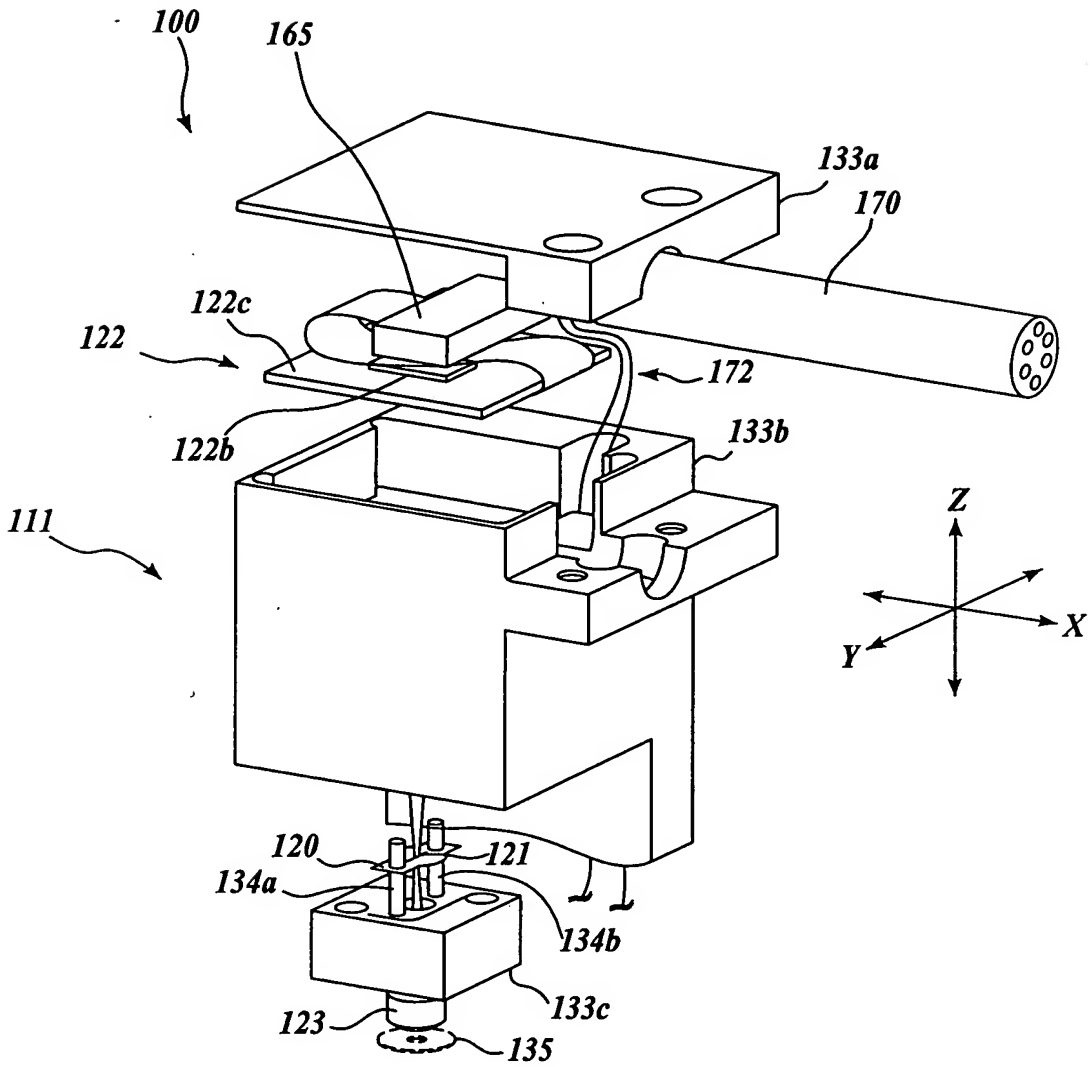

100
165
133a
170
122c
122
172
122b
133b
111
Z
X
Y
120
121
134a
134b
133c
123
135

Fig.24.

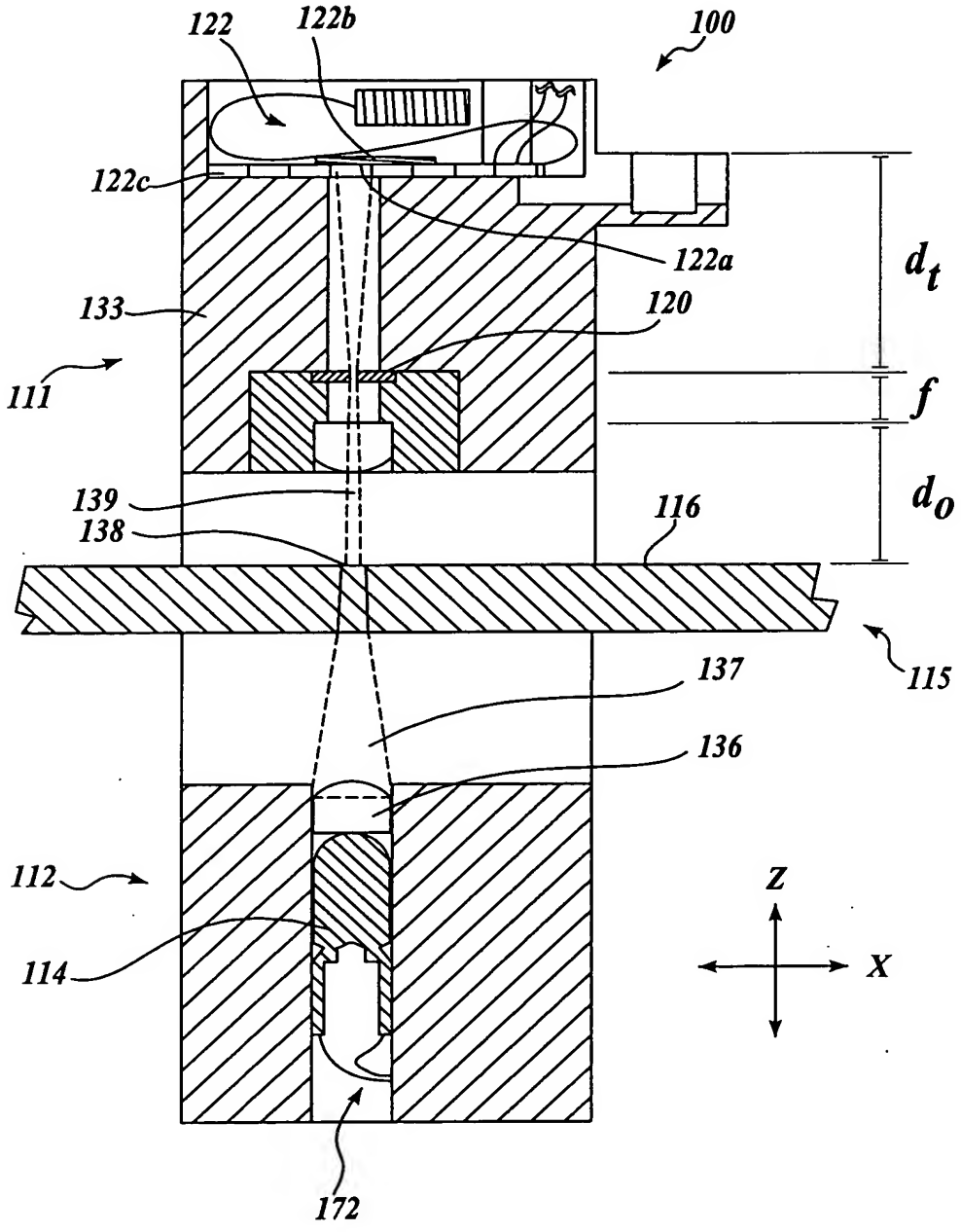

122
122b
100
122c
122a
d_t
133
120
111
f
d_o
139
138
116
115
137
136
112
114
Z
X
172

Fig.25.

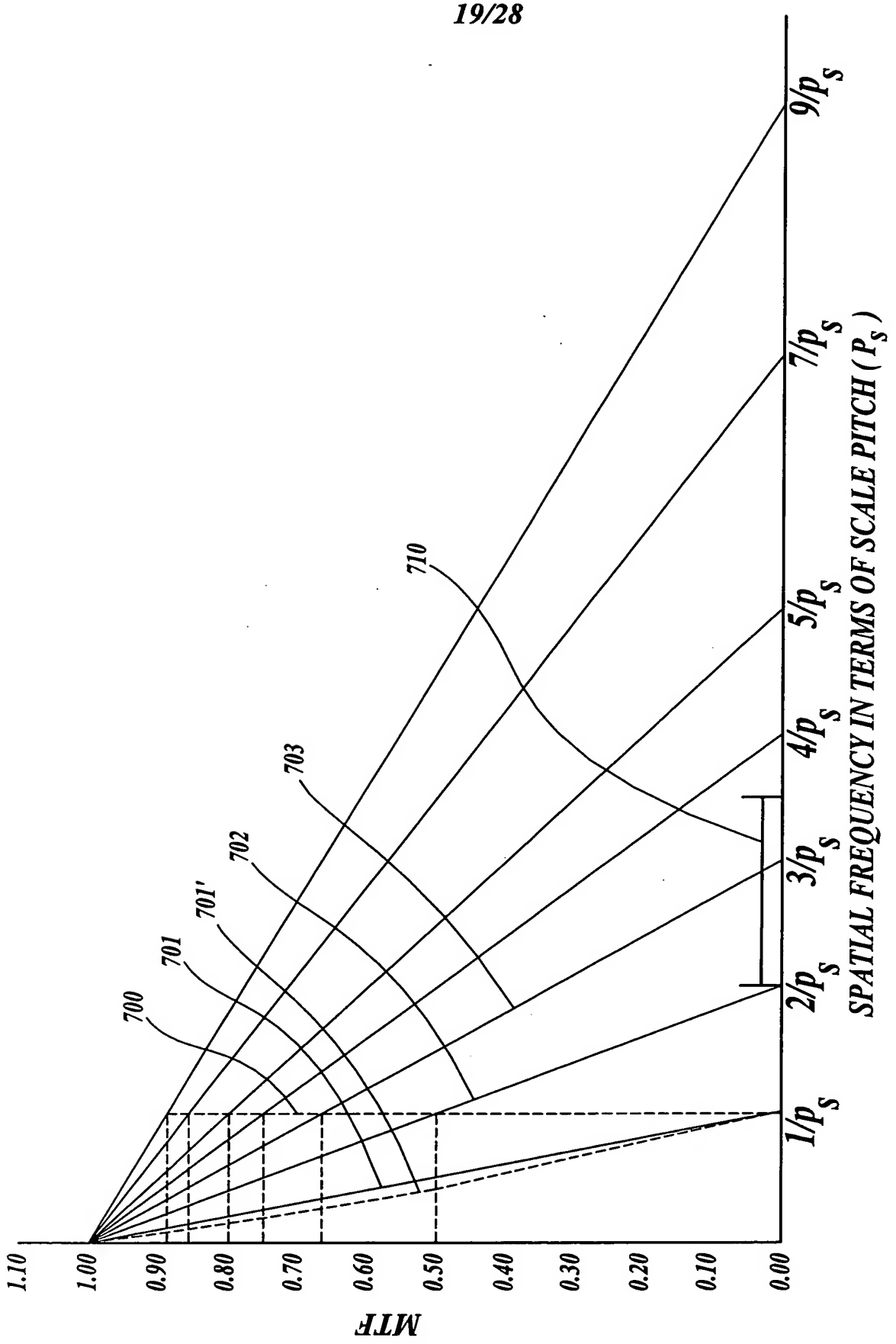

MTF
1.10
1.00
0.90
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
700
701
701'
702
703
710
1/p_S
2/p_S
3/p_S
4/p_S
5/p_S
7/p_S
9/p_S
SPATIAL FREQUENCY IN TERMS OF SCALE PITCH (P_S)

Fig.26.

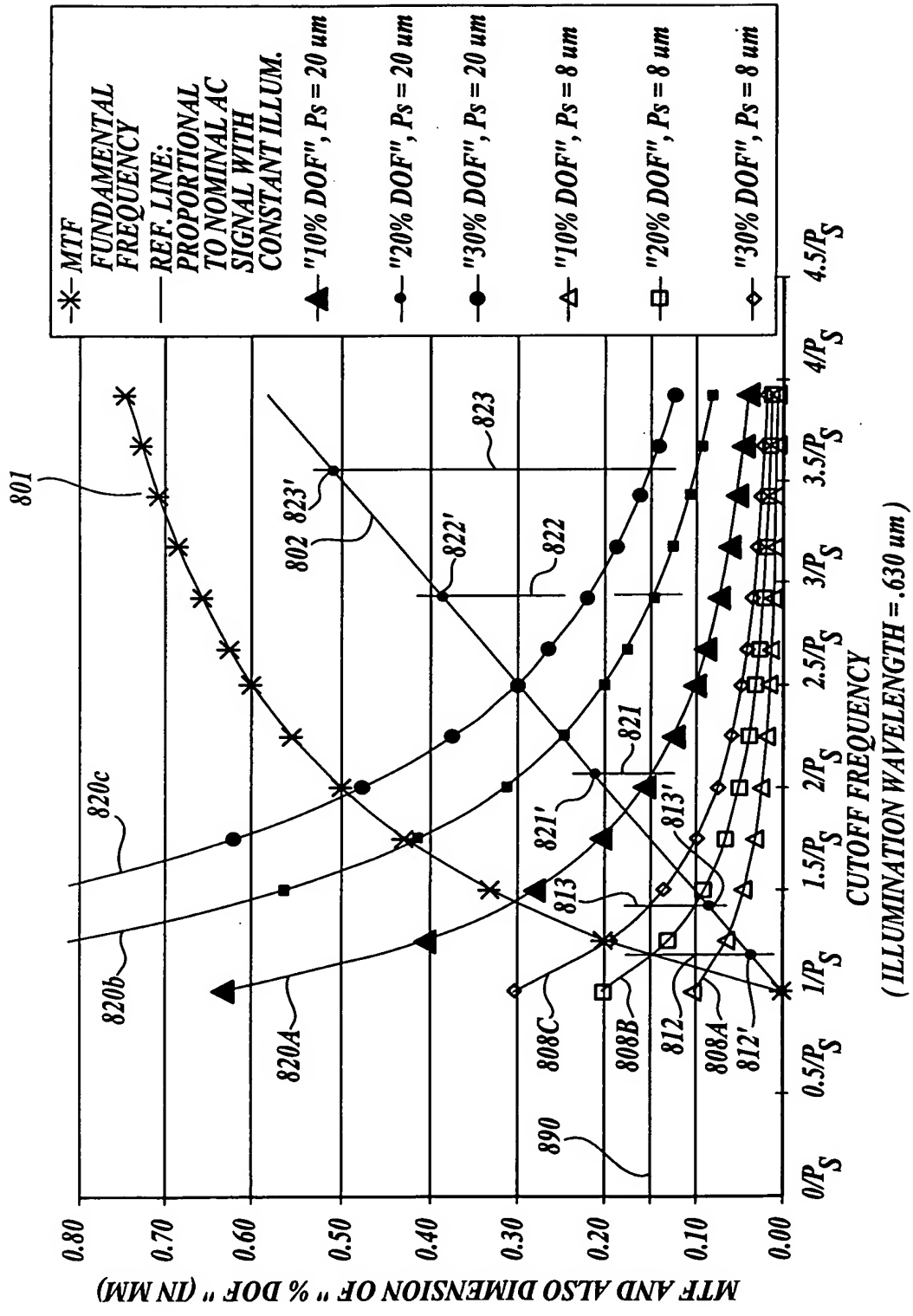

MTF FUNDAMENTAL FREQUENCY
REF. LINE: PROPORTIONAL TO NOMINAL AC SIGNAL WITH CONSTANT ILLUM.
"10% DOF", Ps = 20 um
"20% DOF", Ps = 20 um
"30% DOF", Ps = 20 um
"10% DOF", Ps = 8 um
"20% DOF", Ps = 8 um
"30% DOF", Ps = 8 um
MTF AND ALSO DIMENSION OF " % DOF " (IN MM)
0.80
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
0/Ps
0.5/Ps
1/Ps
1.5/Ps
2/Ps
2.5/Ps
3/Ps
3.5/Ps
4/Ps
4.5/Ps
CUTOFF FREQUENCY
(ILLUMINATION WAVELENGTH = .630 um)
801
820c
820b
820A
802
823'
822'
823
822
821'
821
813'
813
808C
808B
808A
812
812'
890

Fig.27.

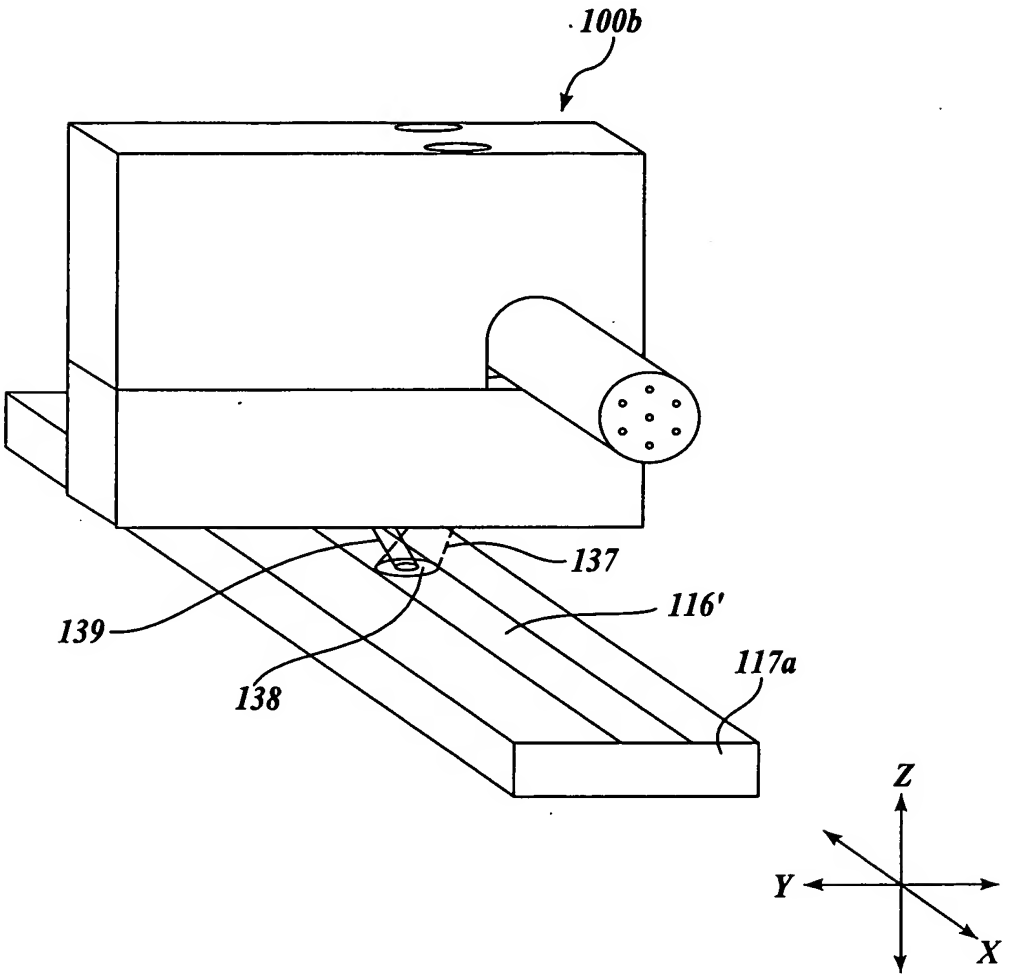


Fig. 28.

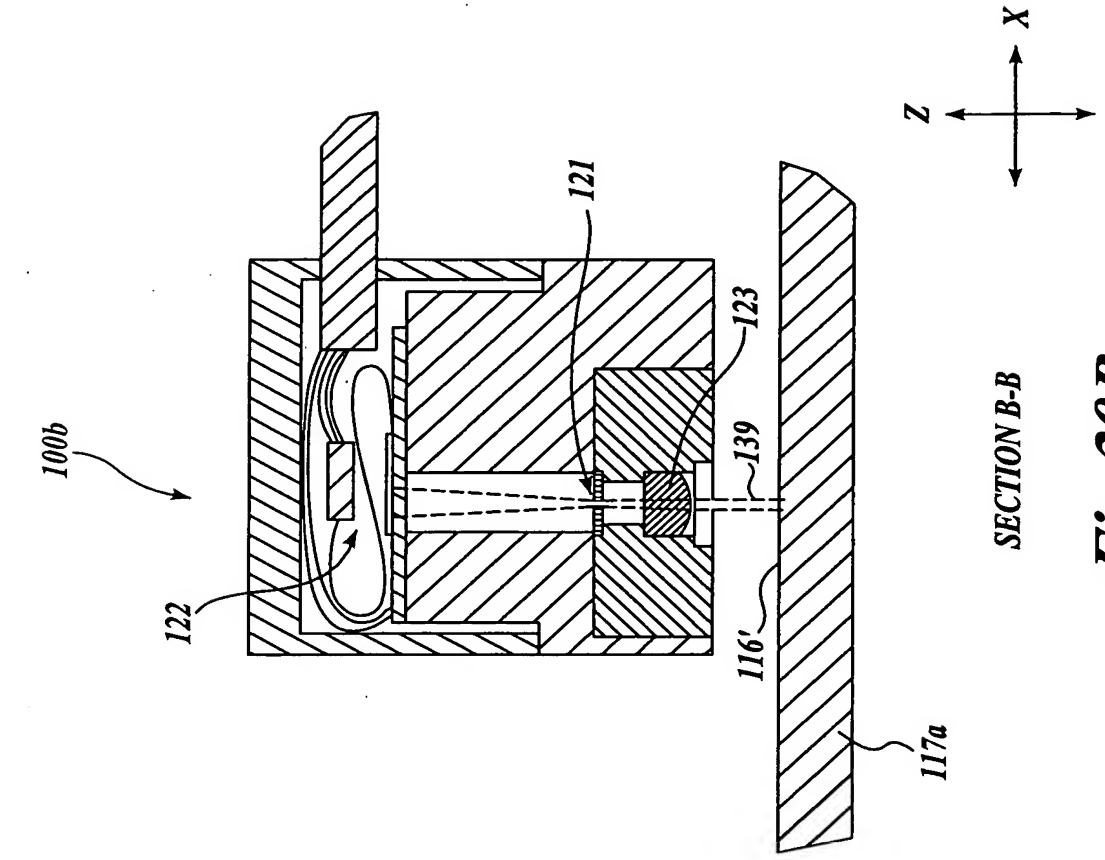


Fig. 29B.

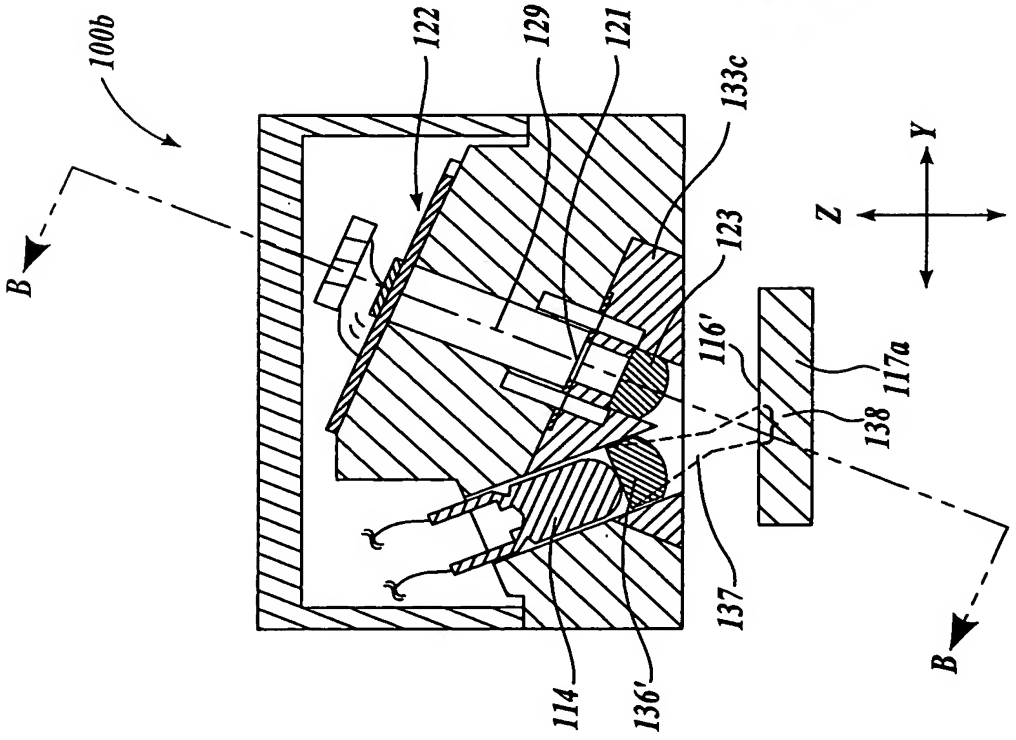


Fig. 29A.

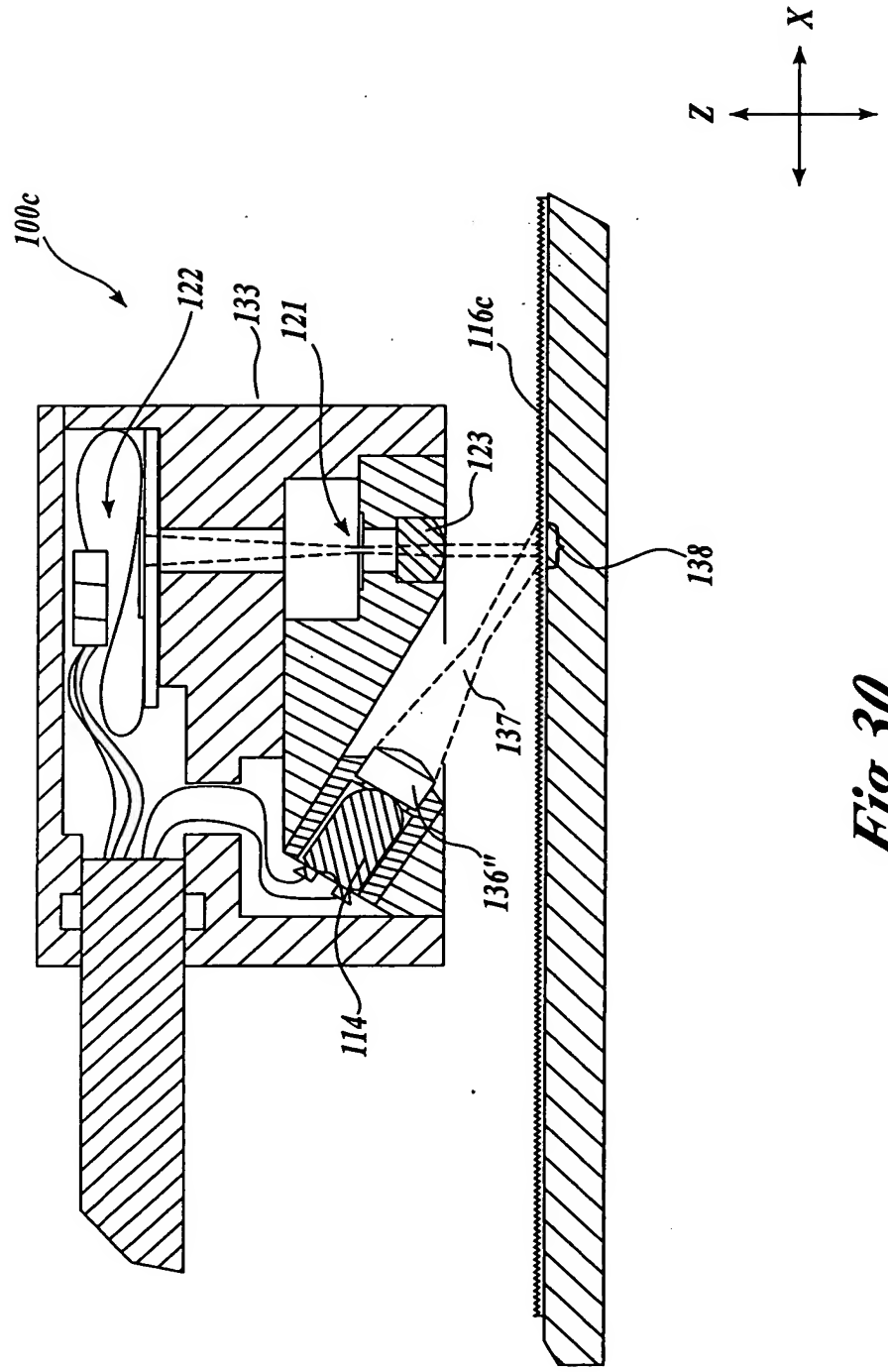


Fig.30.

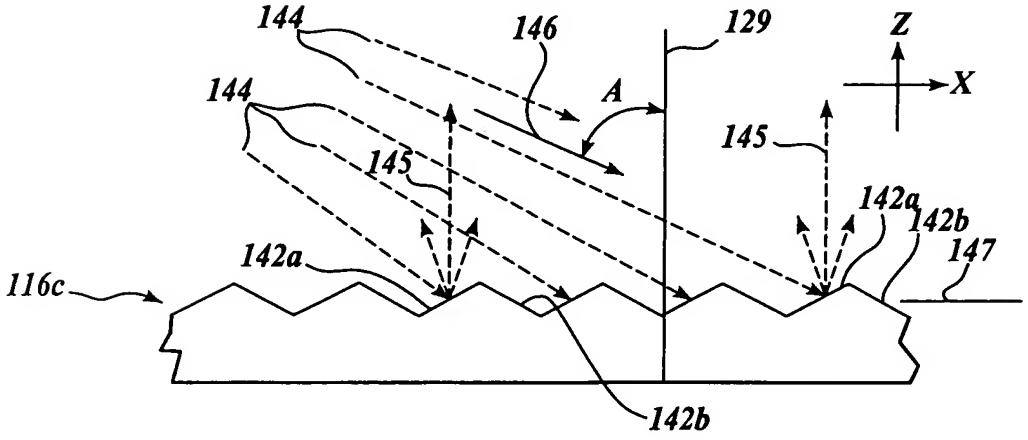


Fig.31.

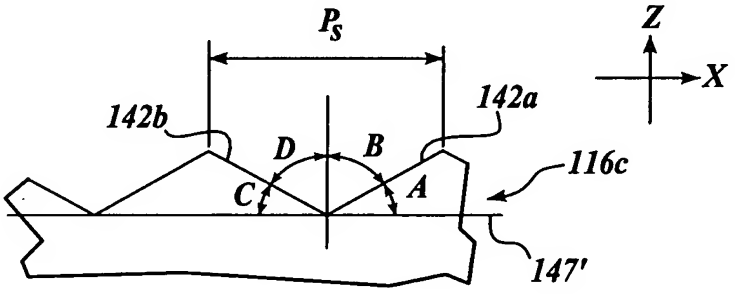


Fig.32.

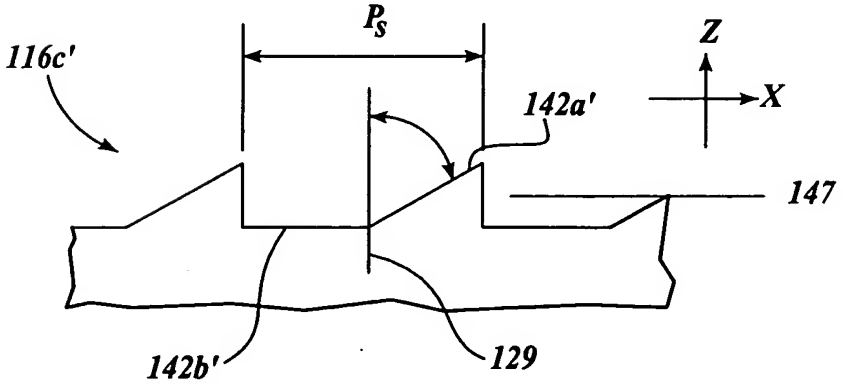


Fig.33.

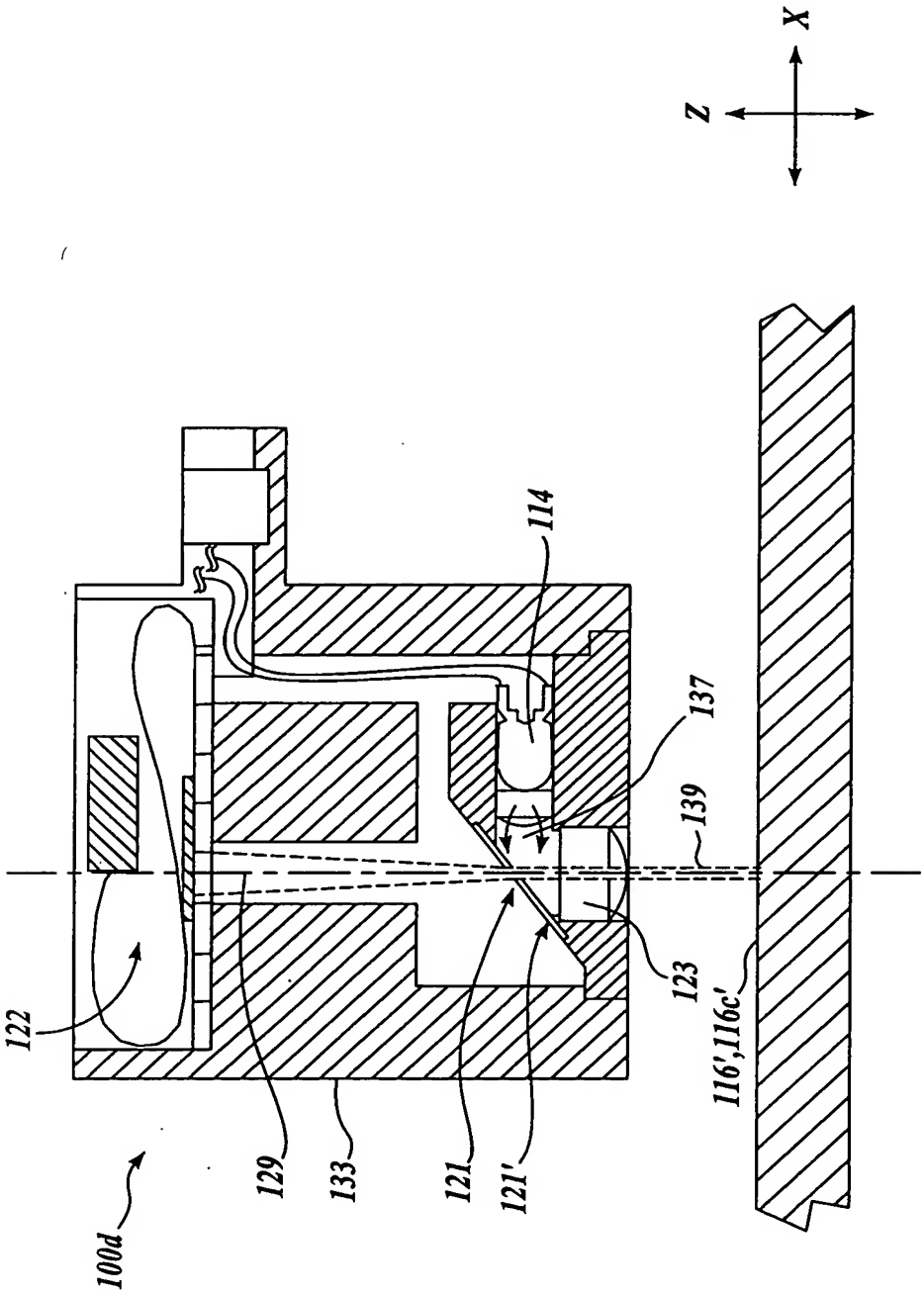


Fig. 34.

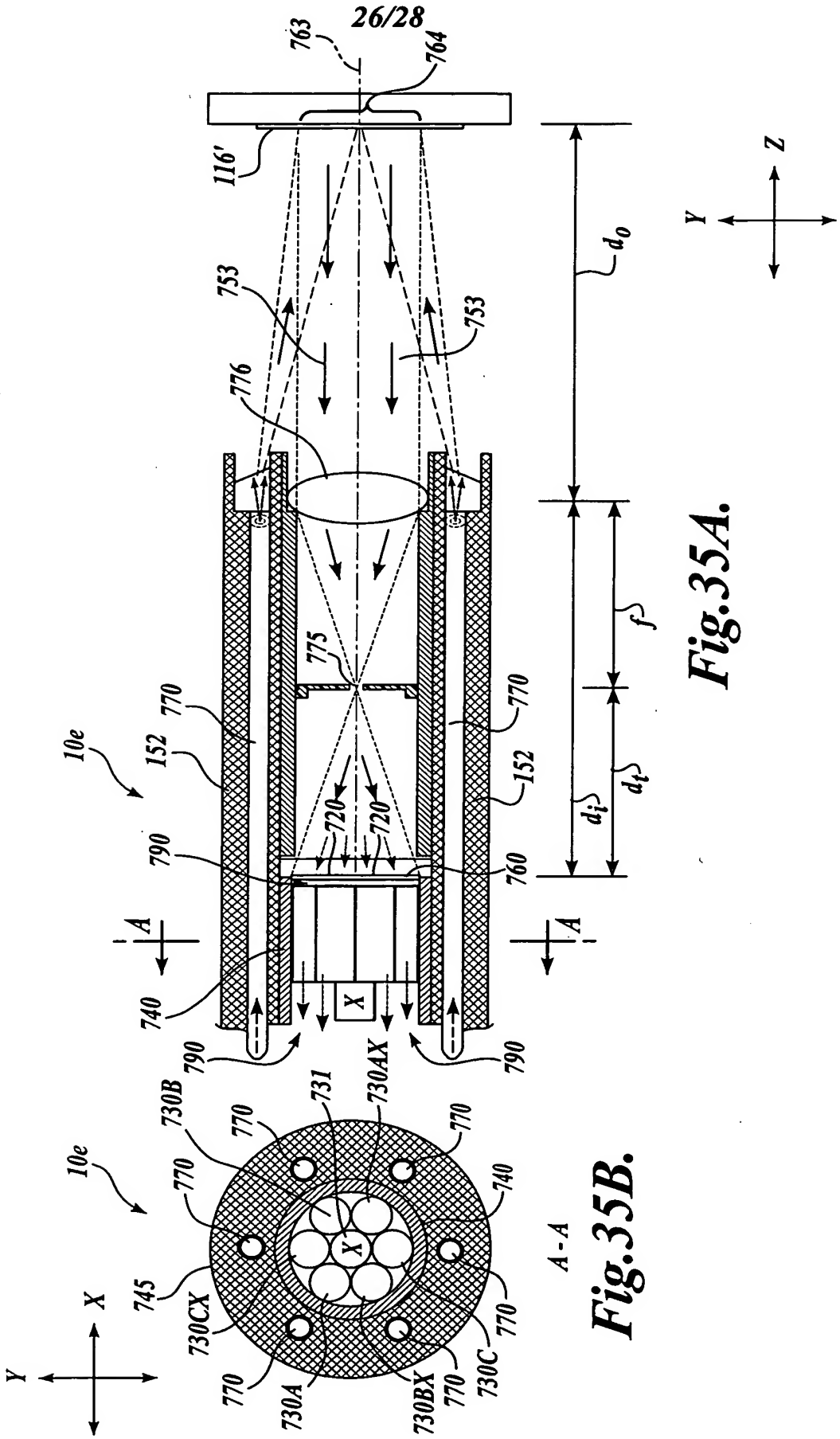


Fig.35A.

Fig.35B.

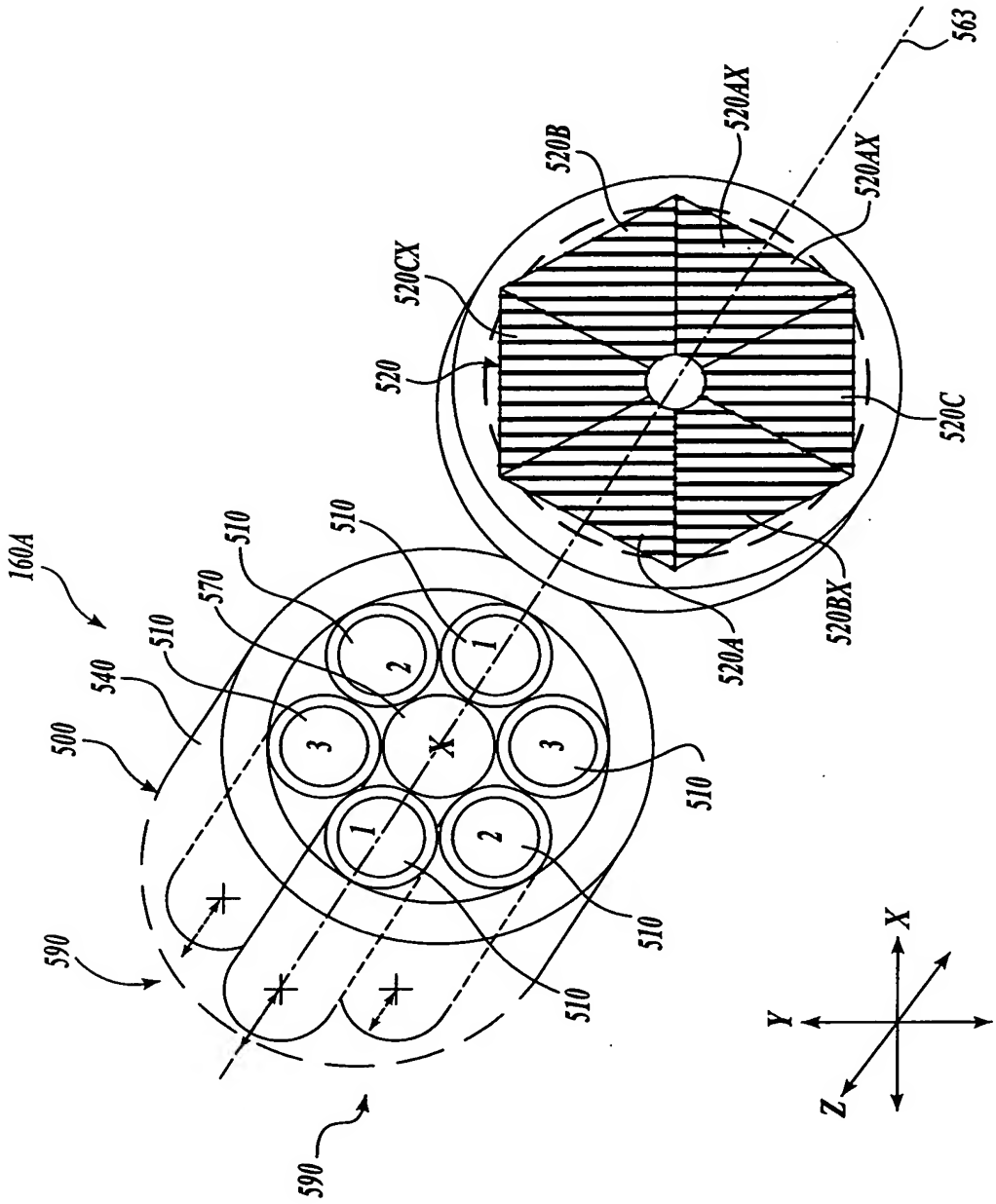

563
520AX
520B
520AX
520CX
520
520C
520BX
520A
160A
510
570
540
500
590
1
2
3
X
Y
Z

Fig.36.

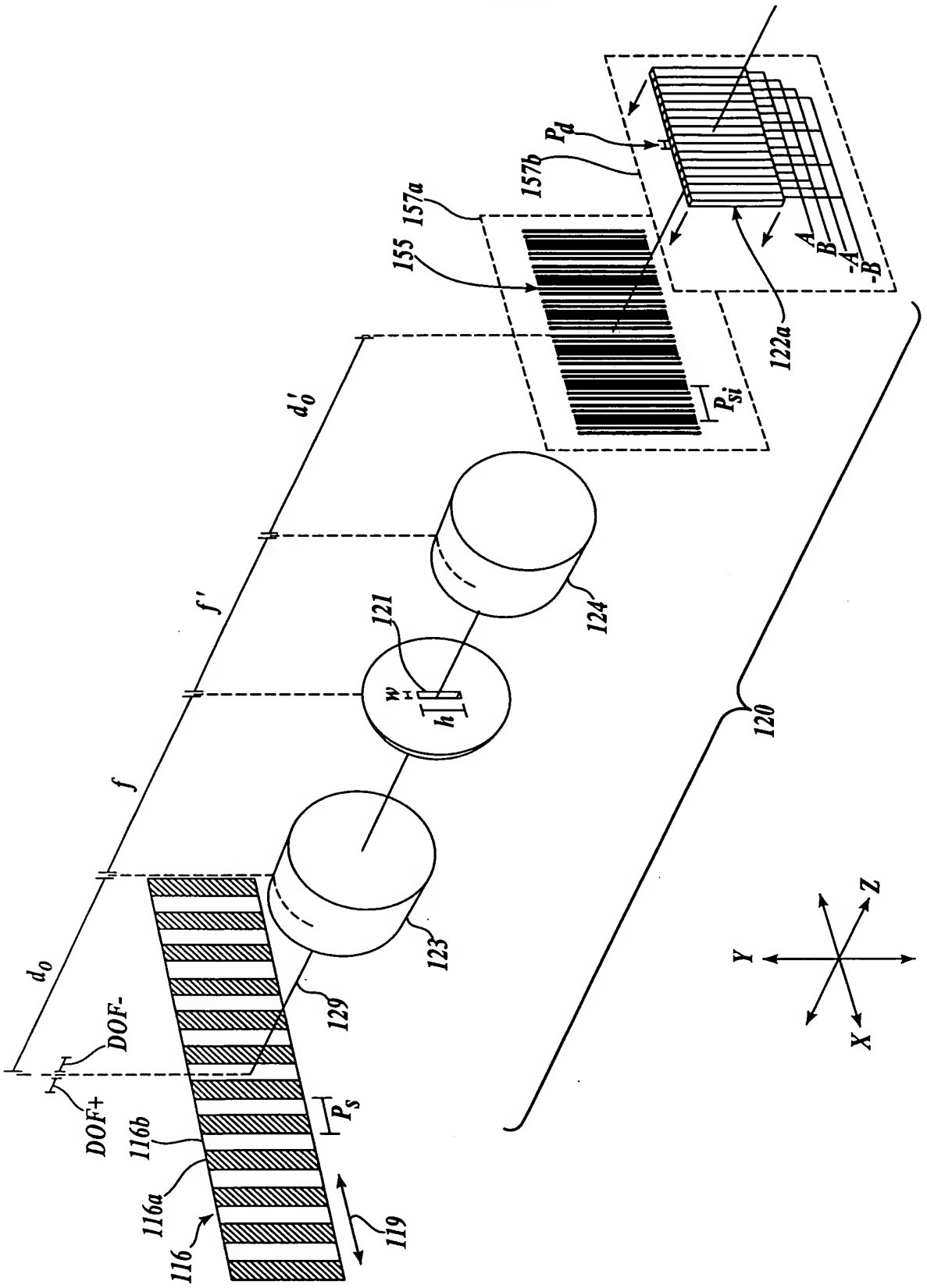

P_d
157b
157a
155
A
B
-A
-B
122a
P_{si}
d_o'
f'
121
w
h
124
f
120
123
129
d_o
DOF-
DOF+
P_s
116b
116a
116
119
Y
Z
X

Fig.37.